

**ACOUSTICAL SITE ASSESSMENT
EMERALD HILL (TPM 21057) RESIDENTIAL SUBDIVISION
EL 07-02-005, APN126-250-23
SAN DIEGO, CA**

Submitted to:

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ISE Project #07-035

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EXECUTIVE SUMMARY

This acoustical site assessment analyzes the 31.85-acre project site located in the Bonsall Community Planning area. The project seeks to subdivide the parcel into for single-family residential lots. Our findings indicate that there would not be any acoustical impacts on any of the proposed parcels. No remedial mitigation is necessary. Additionally, the 60 dBA CNEL noise contour would be between 390-Feet for first floor areas and up to 425-Feet for second level areas. These contours would not touch the proposed parcels.



INTRODUCTION AND DEFINITIONS

Existing Site Characterization

The project site consists of approximately 31.85 acres located in the Bonsall Community Planning Area, within unincorporated the County of San Diego, California. The project is located directly west of State Route 76 (Mission Road). North River Road provides regional access to the project area from Mission Road to the west as can be seen in Figure 1 below.

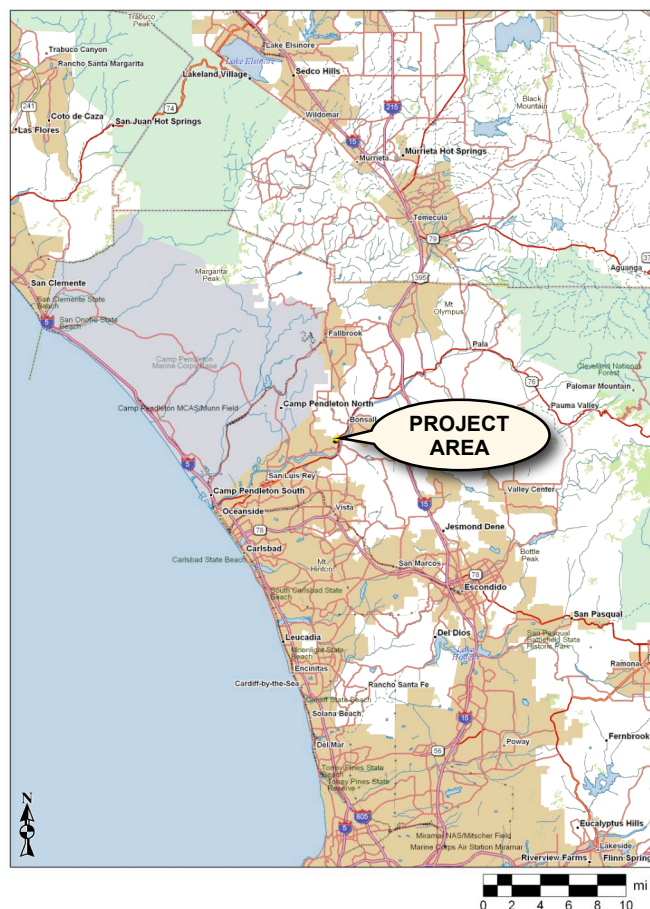


FIGURE 1: Project Vicinity Map (ISE 6/07)

The proposed project site and all surrounding land uses are currently designated as Rural Residential-RR5 and General Agricultural-A70. Elevations on the entire property range from approximately 165 to 380 feet above mean sea level (MSL) as shown in Figure 2 below.



FIGURE 2: Project Site Location Map w/ Topography (ISE 6/07)

Project Description

The proposed Emerald Hill development is a Tentative Parcel Map to subdivide 31.85 acres into four residential lots of 2.21 to 3.11 net acres, with a remainder of 12.97 net acres as can be seen in Figure 3 below. The site is subject to the General Plan Regional Category “Estate Development Area” and Land Use Designations “Estate Residential/17 and Impact Sensitive/24. The General Plan Designations under GP 2020 is SR-4 and RL-40. The site currently contains a single-family home that will be removed.

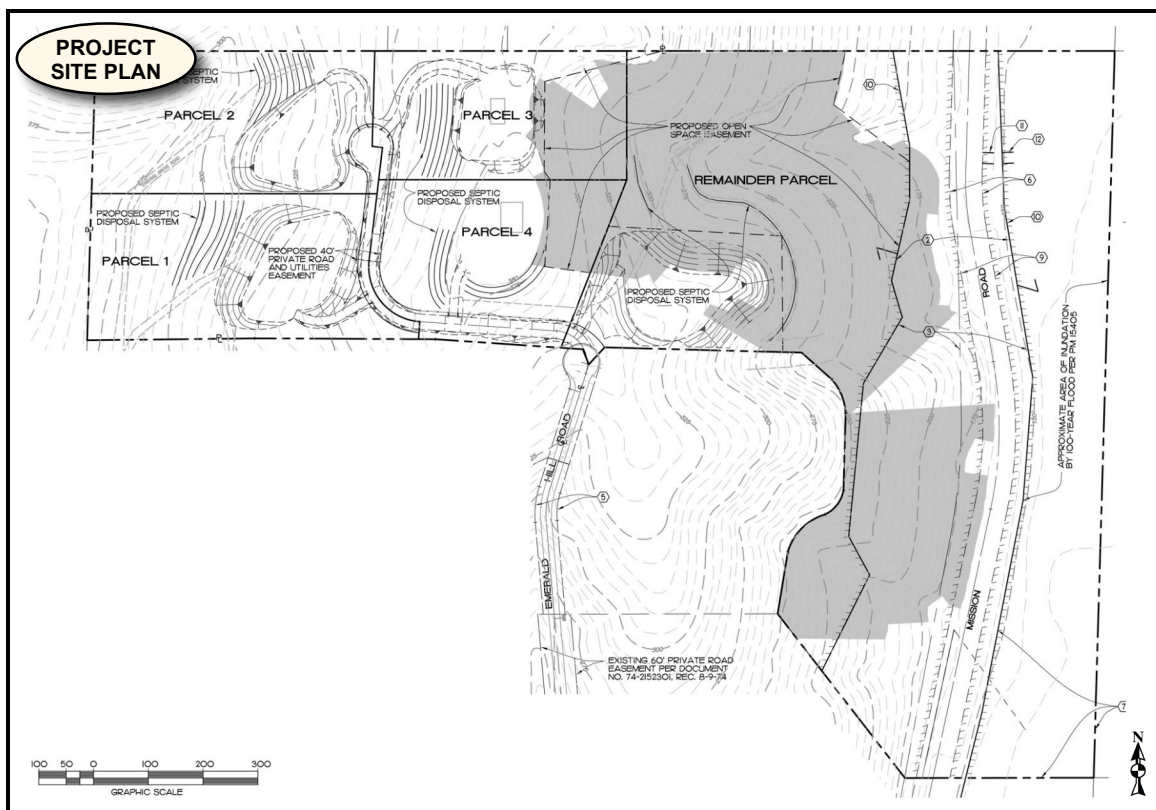


FIGURE 3: Proposed Site Plan – Emerald Hill (TPM 5930) (Snipes-Dye Associates 6/07)

Acoustical Definitions

Sound waves are linear mechanical waves. They can be propagated in solids, liquids, and gases. The material transmitting such a wave oscillates in the direction of propagation of the wave itself. Sound waves originate from some sort of vibrating surface. Whether this surface is the vibrating string of a violin or a person's vocal cords, a vibrating column of air from an organ or clarinet, or a vibrating panel from a loudspeaker, drum, or aircraft, the sound waves generated are all similar. All of these vibrating elements alternatively compress the surrounding air on a forward movement and expand it on a backward movement.

There is a large range of frequencies within which linear waves can be generated, sound waves being confined to the frequency range that can stimulate the auditory organs to the sensation of hearing. For humans this range is from about 20 Hertz (Hz or cycles per second) to about 20,000 Hz. The air transmits these frequency disturbances outward from the source of the wave. Sound waves, if unimpeded, will spread out in all directions from a source. Upon entering the auditory organs, these waves produce the sensation of sound. Waveforms that are approximately periodic or consist of a small number of periodic components can give rise to a pleasant sensation (assuming the intensity is not too high), for example, as in a musical composition.

Noise, on the other hand, can be represented as a superposition of periodic waves with a large number of components and is generally defined as unwanted or annoying sound that is typically associated with human activity and which interferes with or disrupts normal activities. Although exposure to high noise levels has been demonstrated to cause hearing loss, the principal human response to environmental noise is annoyance. The response of individuals to similar noise events is diverse and influenced by the type of noise, the perceived importance of the noise and its appropriateness in the setting, the time of day, and the sensitivity of the individual hearing the sound.

Airborne sound is a rapid fluctuation of air pressure above and below atmospheric levels. The loudest sounds that the human ear can hear comfortably are approximately one trillion (or 1×10^{12}) times the acoustic energy that the ear can barely detect. Because of this vast range, any attempt to represent the acoustic intensity of a particular sound on a linear scale becomes unwieldy. As a result, a logarithmic ratio originally conceived for radio work known as the decibel (dB) is commonly employed¹.

A sound level of zero “0” dB is scaled such that it is defined as the threshold of human hearing and would be barely audible to a human of normal hearing under extremely quiet listening conditions. Such conditions can only be generated in anechoic or “dead rooms”. Typically, the quietest environmental conditions (extreme rural areas with extensive shielding) yield sound levels of approximately 20 decibels. Normal speech has a sound level of approximately 60 dB. Sound levels above 120 dB roughly correspond to the threshold of pain.

The minimum change in sound level that the human ear can detect is approximately 3.0 dBA². A change in sound level of 10 dB is usually perceived by the average person as a doubling (or halving) of the sounds loudness³. A change in sound level of 10 dB actually represents an approximate 90 percent change in the sound intensity, but only about a 50 percent change in the perceived loudness. This is due to the nonlinear response of the human ear to sound.

¹ A unit used to express the intensity of a sound wave. This level is defined as being equal to 20 times the common logarithm of the ratio of the pressure produced by a sound wave of interest to a ‘reference’ pressure wave (which is defined as 1 micro Pascal measured at a distance of 1 meter).

² Every 3 dB equates to a 50% of drop (or increase) in wave strength, therefore a 6 dB drop/increase = a loss/increase of 75% of total signal strength and so on.

³ This is a subjective reference based upon the nonlinear nature of the human ear.

As mentioned above, most of the sounds we hear in the environment do not consist of a single frequency, but rather a broad band of frequencies differing in sound level. The intensities of each frequency add to generate the sound we hear. The method commonly used to quantify environmental sounds consists of determining all of the frequencies of a sound according to a weighting system that reflects the nonlinear response characteristics of the human ear. This is called "A" weighting, and the decibel level measured is called the A-weighted sound level (or dBA). In practice, the level of a noise source is conveniently measured using a sound level meter that includes a filter corresponding to the dBA curve.

Although the A-weighted sound level may adequately indicate the level of environmental noise at any instant in time, community noise levels vary continuously. Most environmental noise includes a conglomeration of sounds from distant sources that create a relatively steady background noise in which no particular source is identifiable. For this type of noise, a single descriptor called the *Leq* (or equivalent sound level) is used. *Leq* is the energy-mean A-weighted sound level during a measured time interval. It is the 'equivalent' constant sound level that would have to be produced by a given source to equal the average of the fluctuating level measured. For most acoustical studies, the monitoring interval is generally taken as one-hour and is abbreviated *Leq-h*.

To describe the time-varying character of environmental noise, the statistical noise descriptors L10, L50, and L90 are commonly used. They are the noise levels equaled or exceeded during 10 percent, 50 percent, and 90 percent of a stated time. Sound levels associated with the L10 typically describe transient or short-term events, while levels associated with the L90 describe the steady state (or most prevalent) noise conditions. In addition, it is often desirable to know the acoustic range of the noise source being measured. This is accomplished through the maximum and minimum measured sound level (Lmax and Lmin) indicators. The Lmin value obtained for a particular monitoring location is often called the *acoustic floor* for that location.

Finally, another sound measure employed by the State of California and the County of San Diego is known as the Community Noise Equivalence Level (CNEL) is defined as the "A" weighted average sound level for a 24-hour day. It is calculated by adding a 5-decibel penalty to sound levels in the evening (7:00 p.m. to 10:00 p.m.), and a 10-decibel penalty to sound levels in the night (10:00 p.m. to 7:00 a.m.) to compensate for the increased sensitivity to noise during the quieter evening and nighttime hours.



APPLICABLE SIGNIFICANCE CRITERIA

Vehicular/Transportation Noise Impact Thresholds

Transportation noise levels, such as those produced by vehicles traveling to and from the project site, are governed under Policy 4b of the *County of San Diego's Noise Element of the County's General Plan (as revised 7/06)*. The relevant sections of the Noise Element are cited below:

Because exterior community noise equivalent levels (CNEL) above 60 decibels and/or interior CNEL above 45 decibels may have an adverse effect on public health and welfare, it is the policy of the County of San Diego that:

1. Whenever it appears that new *development* may result in any (existing or future) *noise sensitive land use* being subject to noise levels of CNEL equal to 60 *decibels (A)* or greater, an acoustical analysis shall be required.
2. If the acoustical analysis shows that noise levels at any *noise sensitive land use* will exceed CNEL equal to 60 decibels, modifications shall be made to the *development* which reduce the *exterior noise* level to less than CNEL of 60 *decibels (A)* and the *interior noise* level to less than CNEL of 45 *decibels (A)*⁴.
3. If modifications are not made to the *development* in accordance with paragraph 2 above, the *development* shall not be approved unless a finding is made that there are specifically identified overriding social or economic considerations which warrant approval of the development without such modification; provided, however, if the acoustical study shows that sound levels for any noise sensitive land use will exceed a CNEL equal to 75 *decibels (A)* even with such modifications, the *development* shall not be approved irrespective of such social or economic considerations.

Definitions, Notes and Exceptions

"*Decibels (A)*" refers to A-weighted sound levels as noted on page VIII-2 within the Element.

"*Development*" means any physical development including but not limited to residences, commercial, or industrial facilities, roads, civic buildings, hospitals, schools, airports, or similar facilities.

"*Exterior noise*":

- (a) For single family detached dwelling projects, "exterior noise" means noise measured at an outdoor living area which adjoins and is on the same lot as the dwelling, and which contains at least the following minimum area:

- | | |
|--|----------------------|
| (i) Net lot area up to 4,000 sq. ft.: | 400 square feet. |
| (ii) Net lot area 4,000 sq. ft. to 10 ac.: | 10% of net lot area. |
| (iii) Net lot area over 10 ac.: | 1 ac. |

⁴ **Action Program 4b1:** Recommend programs to soundproof buildings or redevelop areas where it is impossible to reduce existing source noise to acceptable levels.

Action Program 4b2: Study the feasibility of extending the application of Section 1092, California Administrative Code dealing with noise insulation standards to single-family dwellings, and incorporating higher standards for reduction of exterior noise intrusion into structures.

Action Program 4b3: Require present and projected noise level data to be included in Environmental Impact Reports. Designs to mitigate adverse noise impacts shall also be used.

- (b) For all other projects, "exterior noise" means noise measured at all exterior areas, which are provided for group or private usable, *open space* purposes.
- (c) For County road construction projects, the exterior noise level due to vehicular traffic impacting a noise sensitive area should not exceed the following values:
 - (i) Federally funded projects: The Noise standard contained in applicable Federal Highway Administration Standards.
 - (ii) Other projects: 60 *decibels (A)*, except if the existing or projected noise level without the project is 58 *decibels (A)* or greater, a 3 *decibel (A)* increase is allowed, up to the maximum permitted by Federal Highway Administration Standards.

"Group or Private Usable Open Space" shall mean: Usable open space intended for common use by occupants of a development, either privately owned and maintained or dedicated to a public agency, normally including swimming pools, recreation courts, patios, open landscaped areas, and greenbelts with pedestrian walkways and equestrian and bicycle trails, but not including off-street parking and loading areas or driveways (Group Usable Open Space); and usable open space intended for use of occupants of one dwelling unit, normally including yards, decks and balconies (Private Usable Open Space).

"Interior noise": The following exception shall apply: For rooms which are usually occupied only a part of the day (schools, libraries, or similar), the interior one-hour average sound level, due to noise outside, should not exceed 50 *decibels (A)*.

"Noise sensitive land use" means any residence, hospital, school, hotel, resort, library or any other facility where quiet is an important attribute of the environment.

State of California CCR Title 24 Noise Insulation Standards

The California Code of Regulations (CCR), Title 24, Noise Insulation Standards, states that multi-family dwellings, hotels, and motels located where the CNEL exceeds 60 dba, must obtain an acoustical analysis showing that the proposed design will limit interior noise to less than 45 dba CNEL. Interior noise standards are typically applied to sensitive areas within the structure where low noise levels are desirable (such as living rooms, dining rooms, bedrooms, and dens or studies).

Worst-case noise levels, either existing or future, must be used for this determination. Future noise levels must be predicted at least ten years from the time of building permit application. The County of San Diego has adopted the CCR Title 24 standards as part of their Policy 4b implementation.



ANALYSIS METHODOLOGY

Existing Conditions Field Survey

A Quest Model 2900 ANSI Type 2 integrating sound level meter was used as the data collection device. The meter was mounted to a tripod five-feet above ground level in order to simulate the noise exposure of an average-height human being. Two short-term sound level measurements were taken on the proposed site as described below. The monitoring locations are shown in Figure 4 below.

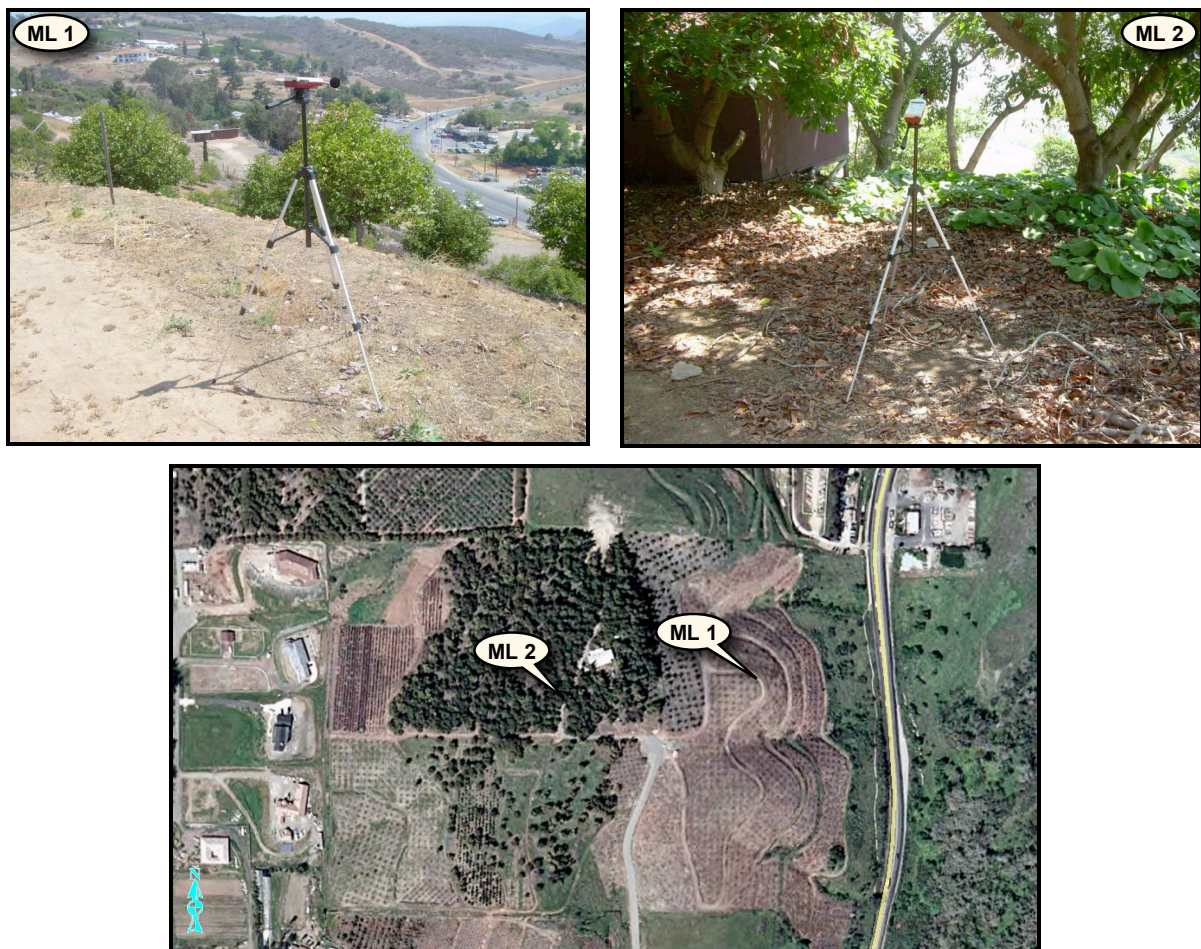


FIGURE 4: Ambient Onsite Monitoring Locations – Emerald Hill (TPM 21057) (ISE 6/07)

The first monitoring location (denoted as ML 1) was selected in the western portion of the project site roughly 400 feet west of Mission Road. The second monitoring location (ML 2) was in the center portion of the site in the proposed Parcel 4 (again refer to Figure 4). Onsite monitoring was performed in this manner in order to obtain an estimate of the worst-case existing onsite noise levels during normal daytime traffic

conditions. All monitoring sites were spatially logged using a geographic positioning system (GPS) to maintain both horizontal and vertical control.

The measurements were performed on June 18, 2007. All equipment was calibrated before testing at ISE's acoustics and vibration laboratory to verify conformance with ANSI S1-4 1983 Type 2 and IEC 651 Type 2 standards.



FINDINGS / RECOMMENDATIONS

Ambient Sound Measurement Results

Testing conditions during the monitoring period were sunny with an average barometric pressure reading of 30.01 in-Hg, an average westerly wind speed of 0 to 1 miles per hour (MPH) and an approximate mean temperature of 70 degrees Fahrenheit. The results of one-hour sound level monitoring are shown in Table 2 below. The values for the energy equivalent sound level (Leq), the maximum and minimum measured sound levels (Lmax and Lmin), and the statistical indicators L10, L50, and L90, are given for each monitoring location.

TABLE 2: Measured Ambient Sound Levels – Emerald Hill (TPM 21057) Project Site

Site	Start Time	1-Hour Noise Level Descriptors in dBA					
		Leq	Lmax	Lmin	L10	L50	L90
ML 1	8:30 a.m.	58.4	63.7	49.4	60.6	57.6	54.8
ML 2	9:30 a.m.	41.1	49.4	38.3	42.6	40.6	39.4

Monitoring Location:

- ML 1: Wester portion of project site facing Mission Road.
GPS: 33°16.407'N x 117°14.226'W, EPE 10 ft.
- ML 2: Central portion of project site facing Mission Road.
GPS: 33°16.398'N x 117°14.327'W, EPE 10 ft.

Measurements performed by ISE on June 18, 2007. EPE = Estimated Position Error.

Measurements collected at the monitoring locations ML 1 and ML 2 reflect the typical sound levels associated with the community setting with existing adjacent major roadway activities. The hourly average sound levels (or Leq-h) recorded over the monitoring period was 58.4 dBA at ML 1, and 41.1 dBA at ML 2 and was observed to be predominately due to surface street traffic for ML 1 and bird noise for ML 2.

As indicated by the monitoring equipment, at least 90 percent of the time (L90) the onsite sound levels at ML 1 and ML 2 were approximately 54.8 and 39.4 dBA, respectively (again indicating the relative frequency of traffic along Mission Road). The acoustic floor for the site, as seen by the Lmin indicator was found to be 49.4 dBA at ML

1 and 38.3 dBA at ML 2. This would be considered the lowest attainable sound levels for the project area near Mission Road.

Traffic Noise Impact Assessment Approach

The *Traffic Noise Model version 2.5* (TNM 2.5) based on FHWA-PD-96-010 and FHWA/CA/TL-87/03 standards was used to calculate future onsite vehicular traffic noise levels. These components are supported by a scientifically founded and experimentally calibrated acoustic computation methodology. The database is made up of over 6,000 individual pass-by events measured at forty sites across the country. Currently TNM 2.5 is the only noise-modeling program accepted by Caltrans for use within the State of California.

Receptor elevations were considered five feet above the appropriate floor (pad) elevation and were taken near the edge of the proposed lot (i.e., within all Noise Sensitive Areas, NSA's) closet to Mission Road. The receptor locations can be seen in Figure 5 on the following page. The TNM model input and output files required for the analysis is provided at the end of this technical report. Input to the acoustical model includes the following:

- A digitized representation of all affected roadways (i.e., Mission Road/SR-76).
- Future Average Daily Trips (ADTs) for nearby major roadways.⁵
- A 95/3/2 (automobiles/medium/heavy) traffic mix in accordance with CALTRANS.
- A peak hour traffic percentage of 10% of the ADT.⁶
- Receptor and topographic elevations as identified in the project site plans.⁷

Future Traffic Noise Impacts

The primary source of future traffic noise near the project site would be from Mission Road. Future traffic estimates for this roadway predict volume as high as 67,000 ADT (*Source: SANDAG Series 10 – 2030 Basic Traffic Prediction Model*). The future speed limit along this roadway is projected to be 55 MPH for all vehicles respectively.

⁵ Source: SANDAG Series 10 – 2030 Basic Traffic Prediction Model.

⁶ For values between approximately 8 and 12 percent, the energy-mean A-weighted sound level is equivalent to the CNEL. Outside this range, a maximum variance of up to two dBA occurs between Leq-h and CNEL.

⁷ Source: Snipes-Dye Associates

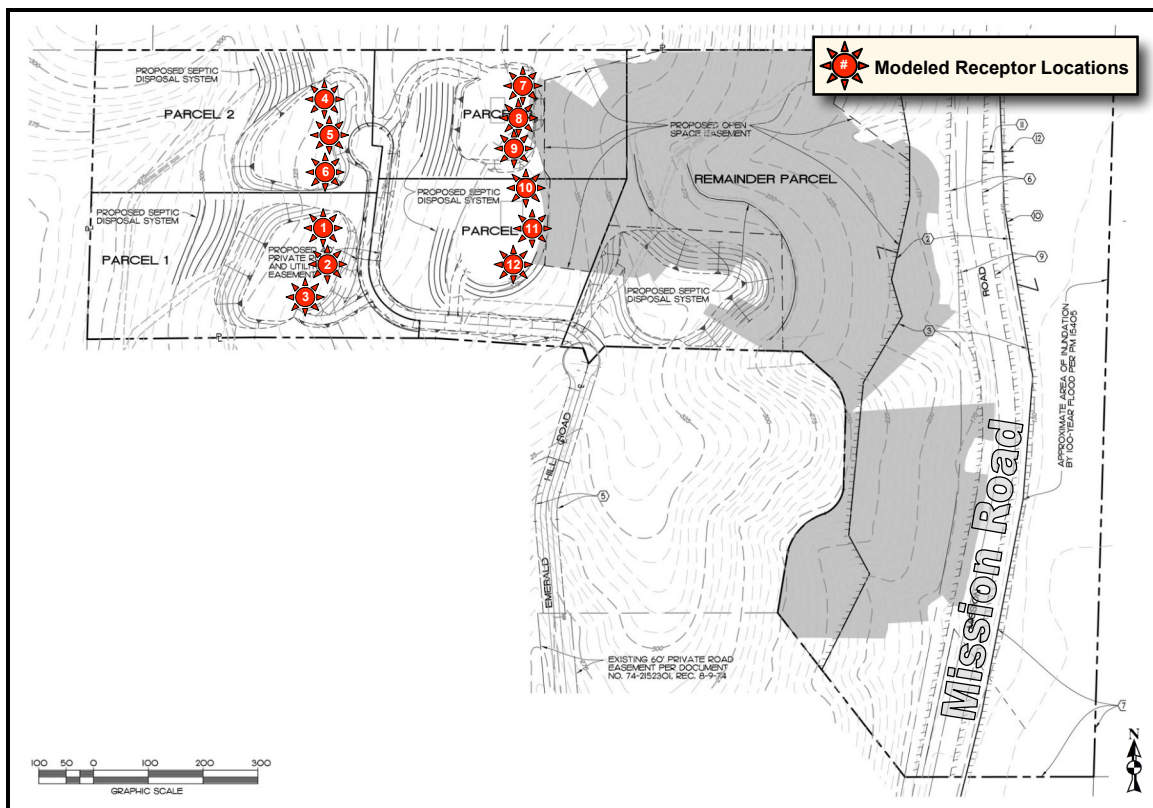


FIGURE 5: Modeled Receptor Locations for TPM 21057 Residential Subdivision(ISE 6/07)

The results of the acoustical modeling are shown below in Table 2 for all lots within the proposed development area. For each receptor examined in Figure 5 above, the unmitigated ground floor (outdoor pad) noise level and unmitigated second floor (outdoor pad) noise level are provided. Additionally, an unobstructed (i.e. without structural barriers) noise contour is shown in Figure 6 on the following page.

TABLE 2: Predicted Transportation Noise Levels – Emerald Hill (TPM 21057)

Modeled Receptor No.	Parcel Number and Location.	First Floor Unmitigated Sound Levels	Second Floor Unmitigated Sound Levels
1	Parcel 1 North	35.5	36.2
2	Parcel 1 East	37.3	38.1
3	Parcel 1 South	38.2	39.0
4	Parcel 2 North	33.2	33.9
5	Parcel 2 East	33.7	34.4
6	Parcel 2 South	33.9	34.5
7	Parcel 3 North	51.0	54.4
8	Parcel 3 East	54.8	55.0
9	Parcel 3 South	54.1	54.3
10	Parcel 4 North	55.1	55.5
11	Parcel 4 East	55.2	55.9
12	Parcel 4 South	53.3	53.9

All levels given in dBA CNEL

Based on the model results, no exterior mitigation would be necessary for any noise sensitive areas since the site would not exceed the County's noise abatement thresholds. Additionally, all building façade areas would not exceed the CCR Title 24 noise abatement threshold.

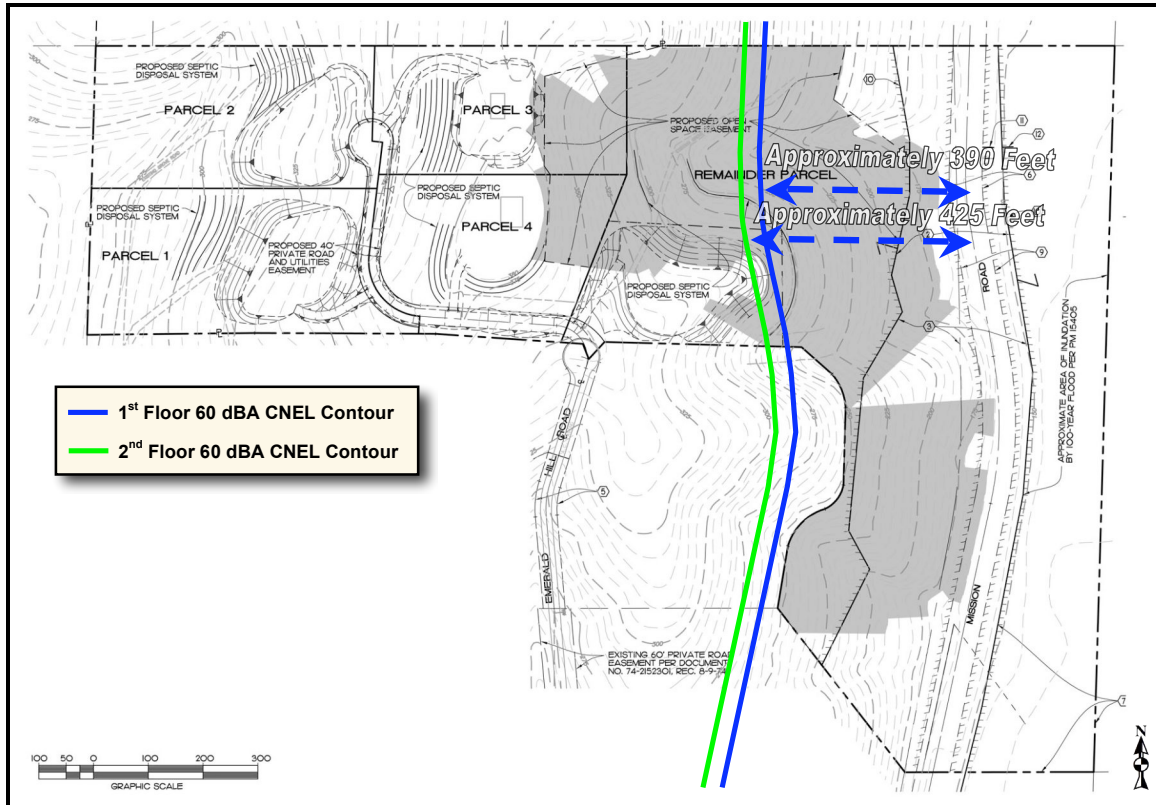


FIGURE 6: Unobstructed 60 Contours for 1st and 2nd Floor from Mission Road Centerline (ISE 6/07)



CERTIFICATION OF ACCURACY AND QUALIFICATIONS

This report was prepared by Investigative Science and Engineering, Inc. (ISE) located at 16486 Bernardo Center Drive, Suite 278, San Diego, CA 92128. The members of its professional staff contributing to the report are listed below:

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ISE affirms to the best of its knowledge and belief that the statements and information contained herein are in all respects true and correct as of the date of this report. Should the reader have any questions regarding the findings and conclusions presented in this report, please do not hesitate to contact ISE at (858) 451-3505.

Content and information contained within this report is intended only for the subject project and is protected under 17 U.S.C. §§ 101 through 810. Original reports contain non-photo blue ISE watermark at the bottom of each page.

Approved as to Form and Content:

Rick Tavares, Ph.D.
Project Principal
Investigative Science and Engineering, Inc.

Attachments to this report: *TNM 2.5 Model Input/Output Decks*

INPUT: ROADWAYS
07-035 Emerald Hill Development

ISE						19 June 2007					
Andre Estrada						TNM 2.5					
INPUT: ROADWAYS											
PROJECT/CONTRACT:		07-035 Emerald Hill Development						Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA			
RUN:		Unmitigated									
Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)			Flow Control			Segment	
				X	Y	Z	Control	Speed	Percent	Pvmt	On
							Device	Constraint	Vehicles	Type	Struct?
									Affected		
	ft			ft	ft	ft		mph	%		
Mission Road	48.0	point1	1	1,558.0	3.0	155.00				Average	
		point2	2	1,657.0	531.0	160.00				Average	
		point3	3	1,665.0	586.0	160.00				Average	
		point4	4	1,669.0	649.0	160.00				Average	
		point5	5	1,667.0	713.0	160.00				Average	
		point6	6	1,655.0	800.0	160.00				Average	
		point7	7	1,609.0	1,027.0	155.00				Average	
		point8	8	1,596.0	1,118.0	155.00				Average	
		point9	9	1,597.0	1,366.0	160.00					

INPUT: TRAFFIC FOR LAeq1h Volumes
07-035 Emerald Hill Development

ISE													
Andre Estrada													
INPUT: TRAFFIC FOR LAeq1h Volumes													
PROJECT/CONTRACT:	07-035 Emerald Hill Development												
RUN:	Unmitigated												
Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Mission Road	point1	1	6270	5	198	5	132	5	0	0	0	0	
	point2	2	6270	5	198	5	132	5	0	0	0	0	
	point3	3	6270	5	198	5	132	5	0	0	0	0	
	point4	4	6270	5	198	5	132	5	0	0	0	0	
	point5	5	6270	5	198	5	132	5	0	0	0	0	
	point6	6	6270	5	198	5	132	5	0	0	0	0	
	point7	7	6270	5	198	5	132	5	0	0	0	0	
	point8	8	6270	5	198	5	132	5	0	0	0	0	
	point9	9											

INPUT: TERRAIN LINES

ISE			19 June 2007	
Andre Estrada			TNM 2.5	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	07-035 Emerald Hill Development			
RUN:	Unmitigated			
Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Terrain Line1	1	813.0	763.0	350.00
	2	833.0	792.0	350.00
	3	910.0	835.0	350.00
	4	920.0	869.0	350.00
	5	901.0	1,024.0	350.00
	6	874.0	1,135.0	350.00
	7	860.0	1,231.0	350.00
	8	893.0	1,299.0	350.00
	9	981.0	1,334.0	350.00
Terrain Line2	10	825.0	316.0	260.00
	11	825.0	395.0	270.00
	12	819.0	447.0	280.00
	13	818.0	520.0	295.00
	14	817.0	566.0	315.00
	15	884.0	606.0	315.00
	16	907.0	623.0	320.00
	17	944.0	653.0	330.00
	18	969.0	671.0	335.00
	19	1,013.0	699.0	335.00
	20	1,039.0	706.0	330.00
	21	1,076.0	750.0	320.00
	22	1,114.0	790.0	310.00
	23	1,183.0	848.0	300.00
	24	1,274.0	921.0	285.00

07-035 Emerald Hill Development

INPUT: TERRAIN LINES

	25	1,314.0	1,028.0	250.00
	26	1,339.0	1,170.0	200.00
	27	1,340.0	1,206.0	195.00
	28	1,339.0	1,236.0	200.00
	29	1,373.0	1,403.0	200.00

07-035 Emerald Hill Development

INPUT: RECEIVERS
07-035 Emerald Hill Development

ISE Andre Estrada											
19 June 2007 TNM 2.5											
INPUT: RECEIVERS PROJECT/CONTRACT: 07-035 Emerald Hill Development RUN: Unmitigated											
Receiver											
Name											
No.											
#DUs											
Coordinates (ground)											
X											
Y											
Z											
Height											
above											
Ground											
Input Sound Levels and Criteria											
Existing											
L_{Aeq}1h											
Impact Criteria											
L_{Aeq}1h											
Sub'l											
NR											
Goal											
Active											
in											
Calc.											
ft											
ft											
ft											
ft											
dBA											
dBA											
dB											
dB											
Parcel 1 North	1	1	454.0	1,018.0	340.00	5.00	0.00	66	10.0	8.0	Y
Parcel 1 East	2	1	456.0	925.0	340.00	5.00	0.00	66	10.0	8.0	Y
Parcel 1 South	3	1	434.0	864.0	340.00	5.00	0.00	66	10.0	8.0	Y
Parcel 2 North	4	1	432.0	1,259.0	330.00	5.00	0.00	66	10.0	8.0	Y
Parcel 2 East	6	1	438.0	1,175.0	330.00	5.00	0.00	66	10.0	8.0	Y
Parcel 2 South	7	1	440.0	1,105.0	330.00	5.00	0.00	66	10.0	8.0	Y
Parcel 3 North	8	1	776.0	1,297.0	370.00	5.00	0.00	66	10.0	8.0	Y
Parcel 3 East	9	1	796.0	1,238.0	370.00	5.00	0.00	66	10.0	8.0	Y
Parcel 3 South	10	1	790.0	1,152.0	370.00	5.00	0.00	66	10.0	8.0	Y
Parcel 4 North	12	1	810.0	1,094.0	380.00	5.00	0.00	66	10.0	8.0	Y
Parcel 4 East	13	1	819.0	1,006.0	380.00	5.00	0.00	66	10.0	8.0	Y
Parcel 4 South	14	1	777.0	937.0	380.00	5.00	0.00	66	10.0	8.0	Y

07-035 Emerald Hill Development

19 June 2007

INPUT: ROADWAYS
07-035 Emerald Hill Development

ISE				19 June 2007							
Andre Estrada				TNM 2.5							
INPUT: ROADWAYS											
PROJECT/CONTRACT:		07-035 Emerald Hill Development								Average pavement type shall be used unless a State highway agency substantiates the use of a different type with the approval of FHWA	
RUN:		2nd Floor									
Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)		Flow Control				Segment	
				X	Y	Z	Control	Speed	Percent	Pvmt	On
							Device	Constraint	Vehicles	Type	Struct?
									Affected		
	ft			ft	ft	ft		mph	%		
Mission Road	48.0	point1	1	1,558.0	3.0	155.00				Average	
		point2	2	1,657.0	531.0	160.00				Average	
		point3	3	1,665.0	586.0	160.00				Average	
		point4	4	1,669.0	649.0	160.00				Average	
		point5	5	1,667.0	713.0	160.00				Average	
		point6	6	1,655.0	800.0	160.00				Average	
		point7	7	1,609.0	1,027.0	155.00				Average	
		point8	8	1,596.0	1,118.0	155.00				Average	
		point9	9	1,597.0	1,366.0	160.00					

INPUT: TRAFFIC FOR LAeq1h Volumes
07-035 Emerald Hill Development

ISE													
Andre Estrada													
INPUT: TRAFFIC FOR LAeq1h Volumes													
PROJECT/CONTRACT:	07-035 Emerald Hill Development												
RUN:	2nd Floor												
Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Mission Road	point1	1	6270	5	198	5	132	5	0	0	0	0	
	point2	2	6270	5	198	5	132	5	0	0	0	0	
	point3	3	6270	5	198	5	132	5	0	0	0	0	
	point4	4	6270	5	198	5	132	5	0	0	0	0	
	point5	5	6270	5	198	5	132	5	0	0	0	0	
	point6	6	6270	5	198	5	132	5	0	0	0	0	
	point7	7	6270	5	198	5	132	5	0	0	0	0	
	point8	8	6270	5	198	5	132	5	0	0	0	0	
	point9	9											

INPUT: TERRAIN LINES

ISE			19 June 2007	
Andre Estrada			TNM 2.5	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	07-035 Emerald Hill Development			
RUN:	2nd Floor			
Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Terrain Line1	1	813.0	763.0	350.00
	2	833.0	792.0	350.00
	3	910.0	835.0	350.00
	4	920.0	869.0	350.00
	5	901.0	1,024.0	350.00
	6	874.0	1,135.0	350.00
	7	860.0	1,231.0	350.00
	8	893.0	1,299.0	350.00
	9	981.0	1,334.0	350.00
Terrain Line2	10	825.0	316.0	260.00
	11	825.0	395.0	270.00
	12	819.0	447.0	280.00
	13	818.0	520.0	295.00
	14	817.0	566.0	315.00
	15	884.0	606.0	315.00
	16	907.0	623.0	320.00
	17	944.0	653.0	330.00
	18	969.0	671.0	335.00
	19	1,013.0	699.0	335.00
	20	1,039.0	706.0	330.00
	21	1,076.0	750.0	320.00
	22	1,114.0	790.0	310.00
	23	1,183.0	848.0	300.00
	24	1,274.0	921.0	285.00

07-035 Emerald Hill Development

INPUT: TERRAIN LINES

	25	1,314.0	1,028.0	250.00
	26	1,339.0	1,170.0	200.00
	27	1,340.0	1,206.0	195.00
	28	1,339.0	1,236.0	200.00
	29	1,373.0	1,403.0	200.00

07-035 Emerald Hill Development

INPUT: RECEIVERS
07-035 Emerald Hill Development

ISE						19 June 2007					
Andre Estrada						TNM 2.5					
INPUT: RECEIVERS											
PROJECT/CONTRACT:			07-035 Emerald Hill Development								
RUN:			2nd Floor								
Receiver											
Name	No.	#DUs	Coordinates (ground)		Z	Height above Ground	Input Sound Levels and Criteria				Active in Calc.
			X	Y			Existing	Impact Criteria		NR	
							L _{Aeq} 1h	L _{Aeq} 1h	Sub'l	Goal	
							dBA	dBA	dB	dB	
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Parcel 1 North	1	1	454.0	1,018.0	340.00	15.00	0.00	66	10.0	8.0	Y
Parcel 1 East	2	1	456.0	925.0	340.00	15.00	0.00	66	10.0	8.0	Y
Parcel 1 South	3	1	434.0	864.0	340.00	15.00	0.00	66	10.0	8.0	Y
Parcel 2 North	4	1	432.0	1,259.0	330.00	15.00	0.00	66	10.0	8.0	Y
Parcel 2 East	6	1	438.0	1,175.0	330.00	15.00	0.00	66	10.0	8.0	Y
Parcel 2 South	7	1	440.0	1,105.0	330.00	15.00	0.00	66	10.0	8.0	Y
Parcel 3 North	8	1	776.0	1,297.0	370.00	15.00	0.00	66	10.0	8.0	Y
Parcel 3 East	9	1	796.0	1,238.0	370.00	15.00	0.00	66	10.0	8.0	Y
Parcel 3 South	10	1	790.0	1,152.0	370.00	15.00	0.00	66	10.0	8.0	Y
Parcel 4 North	12	1	810.0	1,094.0	380.00	15.00	0.00	66	10.0	8.0	Y
Parcel 4 East	13	1	819.0	1,006.0	380.00	15.00	0.00	66	10.0	8.0	Y
Parcel 4 South	14	1	777.0	937.0	380.00	15.00	0.00	66	10.0	8.0	Y

07-035 Emerald Hill Development

C:\TNM25\PROGRAM\EMERALD\2nd Floor

INPUT: ROADWAYS
07-035 Emerald Hill Development

ISE				19 June 2007							
Andre Estrada				TNM 2.5							
INPUT: ROADWAYS											
PROJECT/CONTRACT:		07-035 Emerald Hill Development								Average pavement type shall be used unless	
RUN:		60 Contour 1st Floor								a State highway agency substantiates the use	
										of a different type with the approval of FHWA	
Roadway		Points									
Name	Width	Name	No.	Coordinates (pavement)		Flow Control				Segment	
				X	Y	Z	Control	Speed	Percent	Pvmt	On
							Device	Constraint	Vehicles	Type	Struct?
									Affected		
	ft			ft	ft	ft		mph	%		
Mission Road	48.0	point1	1	1,558.0	3.0	155.00				Average	
		point2	2	1,657.0	531.0	160.00				Average	
		point3	3	1,665.0	586.0	160.00				Average	
		point4	4	1,669.0	649.0	160.00				Average	
		point5	5	1,667.0	713.0	160.00				Average	
		point6	6	1,655.0	800.0	160.00				Average	
		point7	7	1,609.0	1,027.0	155.00				Average	
		point8	8	1,596.0	1,118.0	155.00				Average	
		point9	9	1,597.0	1,366.0	160.00					

INPUT: TRAFFIC FOR LAeq1h Volumes
07-035 Emerald Hill Development

ISE												
Andre Estrada												
INPUT: TRAFFIC FOR LAeq1h Volumes												
PROJECT/CONTRACT:	07-035 Emerald Hill Development											
RUN:	60 Contour 1st Floor											
Roadway	Points											
Name	Name	No.	Segment									
			Autos		MTrucks		HTrucks		Buses		Motorcycles	
			V	S	V	S	V	S	V	S	V	S
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph
Mission Road	point1	1	6270	5	198	5	132	5	0	0	0	0
	point2	2	6270	5	198	5	132	5	0	0	0	0
	point3	3	6270	5	198	5	132	5	0	0	0	0
	point4	4	6270	5	198	5	132	5	0	0	0	0
	point5	5	6270	5	198	5	132	5	0	0	0	0
	point6	6	6270	5	198	5	132	5	0	0	0	0
	point7	7	6270	5	198	5	132	5	0	0	0	0
	point8	8	6270	5	198	5	132	5	0	0	0	0
	point9	9										

INPUT: TERRAIN LINES

ISE			19 June 2007	
Andre Estrada			TNM 2.5	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	07-035 Emerald Hill Development			
RUN:	60 Contour 1st Floor			
Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Terrain Line1	1	813.0	763.0	350.00
	2	833.0	792.0	350.00
	3	910.0	835.0	350.00
	4	920.0	869.0	350.00
	5	901.0	1,024.0	350.00
	6	874.0	1,135.0	350.00
	7	860.0	1,231.0	350.00
	8	893.0	1,299.0	350.00
	9	981.0	1,334.0	350.00
Terrain Line2	10	825.0	316.0	260.00
	11	825.0	395.0	270.00
	12	819.0	447.0	280.00
	13	818.0	520.0	295.00
	14	817.0	566.0	315.00
	15	884.0	606.0	315.00
	16	907.0	623.0	320.00
	17	944.0	653.0	330.00
	18	969.0	671.0	335.00
	19	1,013.0	699.0	335.00
	20	1,039.0	706.0	330.00
	21	1,076.0	750.0	320.00
	22	1,114.0	790.0	310.00
	23	1,183.0	848.0	300.00
	24	1,274.0	921.0	285.00

07-035 Emerald Hill Development

INPUT: TERRAIN LINES

	25	1,314.0	1,028.0	250.00
	26	1,339.0	1,170.0	200.00
	27	1,340.0	1,206.0	195.00
	28	1,339.0	1,236.0	200.00
	29	1,373.0	1,403.0	200.00

07-035 Emerald Hill Development

INPUT: RECEIVERS

07-035 Emerald Hill Development

ISE						19 June 2007					
Andre Estrada						TNM 2.5					
INPUT: RECEIVERS											
PROJECT/CONTRACT:			07-035 Emerald Hill Development								
RUN:			60 Contour 1st Floor								
Receiver											
Name	No.	#DUs	Coordinates (ground)			Height	Input Sound Levels and Criteria				Active
			X	Y	Z	above	Existing	Impact Criteria		NR	in
						Ground	L _{Aeq} 1h	L _{Aeq} 1h	Sub'l	Goal	Calc.
			ft	ft	ft	ft	dBA	dBA	dB	dB	
Point	1	1	1,345.0	1,089.0	225.00	5.00	0.00	66	10.0	8.0	Y
Point	2	1	1,285.0	1,090.0	240.00	5.00	0.00	66	10.0	8.0	Y
Point	3	1	1,245.0	1,086.0	250.00	5.00	0.00	66	10.0	8.0	Y
Point	4	1	1,222.0	1,080.0	255.00	5.00	0.00	66	10.0	8.0	Y
Point	6	1	1,188.0	1,073.0	265.00	5.00	0.00	66	10.0	8.0	Y
Point	7	1	1,112.0	1,061.0	275.00	5.00	0.00	66	10.0	8.0	Y

RESULTS: SOUND LEVELS
07-035 Emerald Hill Development

ISE												
Andre Estrada												
RESULTS: SOUND LEVELS												
PROJECT/CONTRACT: 07-035 Emerald Hill Development												
RUN: 60 Contour 1st Floor												
BARRIER DESIGN: INPUT HEIGHTS												
ATMOSPHERICS: 68 deg F, 50% RH												
Receiver												
NameNo.#DUSExistingNo Barrier												
LAeq1hLAeq1h												
CalculatedCrit'nIncrease over existing												
CalculatedCrit'nSub'l Inc												
Type Impact												
Calculated												
Noise Reduction												
CalculatedGoal												
Calculated minus Goal												
dBA dBA dBA dB dB dB dB												
Point 1 1 0.0 65.6 66 65.6 10 ---- 65.6 0.0 8 -8.0												
Point 2 1 0.0 63.4 66 63.4 10 ---- 63.4 0.0 8 -8.0												
Point 3 1 0.0 61.2 66 61.2 10 ---- 61.2 0.0 8 -8.0												
Point 4 1 0.0 59.9 66 59.9 10 ---- 59.9 0.0 8 -8.0												
Point 6 1 0.0 59.0 66 59.0 10 ---- 59.0 0.0 8 -8.0												
Point 7 1 0.0 56.5 66 56.5 10 ---- 56.5 0.0 8 -8.0												
Dwelling Units												
# DUS Noise Reduction												
Min Avg Max												
dB dB dB												
All Selected 6 0.0 0.0 0.0												
All Impacted 0 0.0 0.0 0.0												
All that meet NR Goal 0 0.0 0.0 0.0												

INPUT: ROADWAYS
07-035 Emerald Hill Development

ISE				19 June 2007							
Andre Estrada				TNM 2.5							
INPUT: ROADWAYS											
PROJECT/CONTRACT:		07-035 Emerald Hill Development								Average pavement type shall be used unless	
RUN:		60 Contour 2nd Floor								a State highway agency substantiates the use	
										of a different type with the approval of FHWA	
Roadway		Points									
Name		Width	Name	No.	Coordinates (pavement)		Flow Control		Segment		
					X	Y	Z	Control	Speed	Percent	Pvmt
								Device	Constraint	Vehicles	Type
										Affected	On
		ft			ft	ft	ft		mph	%	Struct?
Mission Road		48.0	point1	1	1,558.0	3.0	155.00				Average
			point2	2	1,657.0	531.0	160.00				Average
			point3	3	1,665.0	586.0	160.00				Average
			point4	4	1,669.0	649.0	160.00				Average
			point5	5	1,667.0	713.0	160.00				Average
			point6	6	1,655.0	800.0	160.00				Average
			point7	7	1,609.0	1,027.0	155.00				Average
			point8	8	1,596.0	1,118.0	155.00				Average
			point9	9	1,597.0	1,366.0	160.00				

INPUT: TRAFFIC FOR LAeq1h Volumes
07-035 Emerald Hill Development

ISE													
Andre Estrada													
INPUT: TRAFFIC FOR LAeq1h Volumes													
PROJECT/CONTRACT:	07-035 Emerald Hill Development												
RUN:	60 Contour 2nd Floor												
Roadway	Points												
Name	Name	No.	Segment										
			Autos		MTrucks		HTrucks		Buses		Motorcycles		
			V	S	V	S	V	S	V	S	V	S	
			veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	veh/hr	mph	
Mission Road	point1	1	6270	5	198	5	132	5	0	0	0	0	
	point2	2	6270	5	198	5	132	5	0	0	0	0	
	point3	3	6270	5	198	5	132	5	0	0	0	0	
	point4	4	6270	5	198	5	132	5	0	0	0	0	
	point5	5	6270	5	198	5	132	5	0	0	0	0	
	point6	6	6270	5	198	5	132	5	0	0	0	0	
	point7	7	6270	5	198	5	132	5	0	0	0	0	
	point8	8	6270	5	198	5	132	5	0	0	0	0	
	point9	9											

INPUT: TERRAIN LINES

ISE			19 June 2007	
Andre Estrada			TNM 2.5	
INPUT: TERRAIN LINES				
PROJECT/CONTRACT:	07-035 Emerald Hill Development			
RUN:	60 Contour 2nd Floor			
Terrain Line	Points			
Name	No.	Coordinates (ground)		
		X	Y	Z
		ft	ft	ft
Terrain Line1	1	813.0	763.0	350.00
	2	833.0	792.0	350.00
	3	910.0	835.0	350.00
	4	920.0	869.0	350.00
	5	901.0	1,024.0	350.00
	6	874.0	1,135.0	350.00
	7	860.0	1,231.0	350.00
	8	893.0	1,299.0	350.00
	9	981.0	1,334.0	350.00
Terrain Line2	10	825.0	316.0	260.00
	11	825.0	395.0	270.00
	12	819.0	447.0	280.00
	13	818.0	520.0	295.00
	14	817.0	566.0	315.00
	15	884.0	606.0	315.00
	16	907.0	623.0	320.00
	17	944.0	653.0	330.00
	18	969.0	671.0	335.00
	19	1,013.0	699.0	335.00
	20	1,039.0	706.0	330.00
	21	1,076.0	750.0	320.00
	22	1,114.0	790.0	310.00
	23	1,183.0	848.0	300.00
	24	1,274.0	921.0	285.00

07-035 Emerald Hill Development

INPUT: TERRAIN LINES

	25	1,314.0	1,028.0	250.00
	26	1,339.0	1,170.0	200.00
	27	1,340.0	1,206.0	195.00
	28	1,339.0	1,236.0	200.00
	29	1,373.0	1,403.0	200.00

07-035 Emerald Hill Development

INPUT: RECEIVERS
07-035 Emerald Hill Development

ISE Andre Estrada											
19 June 2007 TNM 2.5											
INPUT: RECEIVERS PROJECT/CONTRACT: 07-035 Emerald Hill Development RUN: 60 Contour 2nd Floor											
Receiver											
Name											
No.											
#DUs											
Coordinates (ground)											
X											
Y											
Z											
Height											
above											
Ground											
Input Sound Levels and Criteria											
Existing											
L_{Aeq}1h											
Impact Criteria											
L_{Aeq}1h											
Sub'l											
NR											
Goal											
Active											
in											
Calc.											
ft											
ft											
ft											
ft											
dBA											
dBA											
dB											
dB											
Point	1	1	1,345.0	1,089.0	225.00	5.00	0.00	66	10.0	8.0	Y
Point	2	1	1,285.0	1,090.0	240.00	5.00	0.00	66	10.0	8.0	Y
Point	3	1	1,245.0	1,086.0	250.00	5.00	0.00	66	10.0	8.0	Y
Point	4	1	1,222.0	1,080.0	255.00	5.00	0.00	66	10.0	8.0	Y
Point	6	1	1,188.0	1,073.0	265.00	5.00	0.00	66	10.0	8.0	Y
Point	7	1	1,112.0	1,061.0	275.00	5.00	0.00	66	10.0	8.0	Y

RESULTS: SOUND LEVELS
07-035 Emerald Hill Development

ISE Andre Estrada												
RESULTS: SOUND LEVELS PROJECT/CONTRACT: 07-035 Emerald Hill Development RUN: 60 Contour 2nd Floor BARRIER DESIGN: INPUT HEIGHTS ATMOSPHERICS: 68 deg F, 50% RH												
19 June 2007 TNM 2.5 Calculated with TNM 2.5 Average pavement type shall be used unless a State highway agency substantiates the use of a different type with approval of FHWA.												
Receiver												
Name	No.	#DUs	Existing LAeq1h	No Barrier LAeq1h Calculated	Crit'n	Increase over existing Calculated	Crit'n Sub'l Inc	Type Impact	With Barrier Calculated LAeq1h	Noise Reduction Calculated	Goal	Calculated minus Goal
			dB	dB	dB	dB	dB		dB	dB	dB	dB
Point	1	1	0.0	65.6	66	65.6	10	----	65.6	0.0	8	-8.0
Point	2	1	0.0	63.4	66	63.4	10	----	63.4	0.0	8	-8.0
Point	3	1	0.0	61.2	66	61.2	10	----	61.2	0.0	8	-8.0
Point	4	1	0.0	59.9	66	59.9	10	----	59.9	0.0	8	-8.0
Point	6	1	0.0	59.0	66	59.0	10	----	59.0	0.0	8	-8.0
Point	7	1	0.0	56.5	66	56.5	10	----	56.5	0.0	8	-8.0
Dwelling Units		# DUs	Noise Reduction									
			Min	Avg	Max							
			dB	dB	dB							
All Selected		6	0.0	0.0	0.0							
All Impacted		0	0.0	0.0	0.0							
All that meet NR Goal		0	0.0	0.0	0.0							